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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,877	11/26/2003	Junjie Gu	P8940	9330
33438	7590	10/11/2006	EXAMINER	
HAMILTON & TERRILE, LLP P.O. BOX 203518 AUSTIN, TX 78720			NGUYEN, PHILLIP H	
			ART UNIT	PAPER NUMBER
			2193	

DATE MAILED: 10/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/723,877

Applicant(s)

GU, JUNJIE

Examiner

Phillip H. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-11, 13-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20040607</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the original filing of November 26, 2003. Claims 1-18 are pending and have been considered below.

Specification

2. The abstract of the disclosure is objected to because there are more than 150 words. Correction is required. See MPEP § 608.01(b).
3. The incorporation of essential material in the specification by reference to a publication is improper (Paragraph 36; A Comparative Study of Static and Profile-based heuristics for Inlining). Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f).
4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Figure 2, item 30, Binary. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in

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the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claims 14-18 are objected to because it is not clear to the examiner whether the applicant claims a method or a system. Applicant is recommended to recite the computer system instead of the method. Correction is required.

Allowable Subject Matter

6. Claims 6, 12, 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 3, 4, 9, 10, 15, and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In each of the claims 3, 6, and 9, the applicant recites the limitation "said subroutines". There is insufficient antecedent basis for these limitations in this claim. It is unclear to the Examiner whether the applicant is referred to "said procedure" or a new limitation. For the examining purposes, the examiner reads it as "said procedure". The dependent claims, 4, 10, and 16 are rejected for the same reason as set forth in connection with based claims.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

10. Claim 1-5, 7-11, and 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Carini (US 5,740,443).

Claim 1: Carini discloses a computer controlled method for improving runtime performance of a source program by a compiler, said method comprising:

a. analyzing (The compilation model provides an Interprocedural Analysis, during which each procedure in the program is visited.) said source program comprising procedures to generate a call graph (constructing a program call graph (PCG)) of said source program, wherein each of said procedures has a first know execution frequency (number of calls) (Col 8, line 8-12);

b. using said call graph in conjunction with inlining plans (Figure 3, procedure main is inlined and each sub (call statement) is a non root node) by an inlining algorithm (Col 10, line 8-10; first, calculates the routine cost function then based on those cost to select one call at a time) to generate an inlined version of said source program wherein selected call sites have been inlined (procedure inlining..... may be performed in Col 9, line 15-17);

c. generating an updated execution frequency for each of procedures (Col 10, line 43-67; Col 11, lin 1-25; Each parameter is tunable and the process was repeatedly until the values of the parameters stabilized, which is updated); and

d. using said updated execution frequency for each of said procedures to generate optimized executable code for said sour program (Optimized code is generated in Col 9, line28-29).

Claim 2: Carini discloses the method as in claim 1 above; and further discloses wherein said inlining algorithm further comprises using heuristics (Interprocedural Analysis inputs are collected and saved for later use) to calculate cost/benefit ratios for calls in said procedures of said source program to generate a ranking (short and simple

or complex in Col 9, line 41 and high cost and lower cost in Col 9, line 43) of said call sites (Col 7, line 53-67; Col 8, line 1-7).

Claim 3: Carini discloses the method as in claim 2 above; and further discloses wherein said inlining algorithm further comprises using said ranking cost/benefit ratios to select calls in said procedure for inlining (Col 9, line 51-55).

Claim 4: Carini discloses the method as in claim 3 above; and further discloses wherein said selected calls are inlined until a predetermined resource limit has been reached, wherein said predetermined resource limits (such as threshold values) part of said heuristic (Col 9, line 60-68; Col 10, line 1-10);

Claim 5: Carini discloses the method as in claim 1 above; and further discloses updated execution frequency (number of calls) is computed each time any of said call sites is determined to be inlined (Since the parameters are tunable and the process is repeatedly until the values of the parameters are stabilized (updated) therefore it's updated each time in Col 10, line 43-67; Col 11, line 1-25).

Claim 7: Carini discloses a computer controlled method of optimized binary code of a source program which is compiled to run a computer, said source program comprising procedures, said method comprising:

a. providing a compiler system configured to accept said source program and to output binary code representing said source program which is capable of being processed of said computer architecture, aid compiler system comprising a code optimizer portion (Col 7, line 19). Although, Carini dose not explicitly disclose a front end portion and back end portion. It is inherent in Carini's compiler system that a front end portion must exist in order to check syntax and detect errors before the source code fetched to the code optimizer. After that the intermediate representation generated (Col 8, line 12) from the back end portion;

b. providing said code optimizer portion of said compiler system configured to accept intermediate code from said front end portion of said compiler system and to analyze said source program comprising procedures to generate a call graph of said source program wherein each of said procedures has a first known execution frequency (Col 8, line 8-12);

c. using said call graph in conjunction with inlining plans by an inlining algorithm in said code optimizer to generate an inlined version of said source program, wherein selected call sits have been inlined (Col 9, line 15-17);

d. using said code optimizer to generate an updated execution frequency for said procedure (Each parameter is tunable and the process was repeatedly until the values of the parameters stabilized, which is updated in Col 10, line 43-67; Col 11, line 1-25);

e. using said code optimizer to generate an intermediate optimized code version of said source program by processing said inlined source program with said updated execution frequency (Col 9, line 10); and

f. providing said intermediate optimized code to a back-end code generator to generate optimized binary code (object code) for said source program (Col 9, line 21-22).

Claim 8: Carini discloses the method as in claim 7 above; and further discloses wherein said inlining algorithm further comprises using heuristics (Interprocedural Analysis inputs are collected and saved for later use) to calculate cost/benefit ratios for calls in said procedures of said source program to generate a ranking (short and simple or complex in Col 9, line 41 and high cost and lower cost in Col 9, line 43) of said call sites (Col 7, line 53-67; Col 8, line 1-7).

Claim 9: Carini discloses the method as in claim 7 above; and further discloses wherein said inlining algorithm further comprises using said ranking cost/benefit ratios to select calls in said procedure for inlining (Col 9, line 51-55).

Claim 10: Carini discloses the method as in claim 7 above; and further discloses wherein said selected calls are inlined until a predetermined resource limit has been reached, wherein said predetermined resource (threshold values) limit is part of said heuristic (Col 9, line 60-68; Col 10, line 1-10);

Claim 11: Carini discloses the method as in claim 7 above; and further discloses updated execution frequency (number of calls) is computed each time any of said call

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sites is determined to be inlined (Since the parameters are tunable and the process is repeatedly until the values of the parameters are stabilized (updated) therefore it's updated each time in Col 10, line 43-67; Col 11, line 1-25).

Claim 13: Carini disclose a computer system comprising:

- a. central processing unit (CPU) (Figure 4, item 116);
- b. random access memory (RAM) (Figure 4, item 114) coupled to said CPU, for use in compiling a source program to run on said computer system, said source program comprising procedures (each procedure in the program....in Col 7, line 54);
- c. accept intermediate code from said front end portion of said compiler system and to analyze said source program to generate a call graph of said source program wherein each of said procedures has a first known execution frequency (number of calls) (Col 8, line 8-12);
- d. process said call graph (interprocedural analysis is a reverse topological traversal of the PCG) in conjunction with inlining plans (Figure 3, procedure main is inlined and each sub (call statement) is a non root node) by an inlining algorithm (Col 10, line 8-10; first, calculates the routine cost function then based on those cost to select one call at a time) to generate an inlined version of said source program wherein selected call sites have been inlined (procedure inlining..... may be performed in Col 9, line 15-17);

e. generate an updated execution frequency for each of said procedures (Col 10, line 43-67; Col 11, lin 1-25; Each parameter is tunable and the process was repeatedly until the values of the parameters stabilized, which is updated);

f. generate an intermediate optimized code version (intermediate representation may be transformed to reflect the results of interprocedural constant propagation) of said source program by processing said inlined source program with said updated execution frequency for each of said procedures (Col 9, line 21-22);

g. although, Carini does not explicitly disclose the back-end portion in his compiler system to obtain intermediate code and generates binary code (object code). Back end must be inherent in Carini's compiler system in order to generate binary code (object code); and

h. wherein said back-end code generator is operable to generate optimized binary code (object code) for said source program for execution by said central processing unit (Col 9, line 27-28).

Claim 14: Carini discloses the computer system as in claim 13 above; and further discloses wherein said inlining algorithm further comprises using heuristics (Interprocedural Analysis inputs are collected and saved for later use) to calculate cost/benefit ratios for calls in said procedures of said source program to generate a ranking (short and simple or complex in Col 9, line 41 and high cost and lower cost in Col 9, line 43) of said call sites (Col 7, line 50-67; Col 8, line 1-8);

Claim 15: Carini discloses the compute system as in claim 14 above; and further discloses wherein said inlining algorithm further comprises using said ranking cost/benefit ratios to select calls in said procedures for inlining (Col 9, line 51-55).

Claim 16: Carini discloses the computer system as in claim 15 above; and further discloses wherein said selected calls are inlined until a predetermined resource (threshold values) limit has been reached, wherein said predetermined resource limit is part of said heuristic (Col 9, line 60-65; Col 10, line 1-10).

Claim 17: Carini discloses the system as in claim 13 above; and further discloses updated execution frequency (number of calls) is computed each time any of said call sites is determined to be inlined (Since the parameters are tunable and the process is repeatedly until the values of the parameters are stabilized (updated) therefore it's updated each time in Col 10, line 43-67; Col 11, line 1-25).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Peyton, Jr et al. (US 5,920,723) discloses Compiler with inter-modular procedure optimization.

b. Schmidt (US 6,195,793) discloses method and computer program product for adaptive inlining in a computer system.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip H. Nguyen whose telephone number is (571) 270-1070. The examiner can normally be reached on Monday - Friday 10:00 AM - 3:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571) 272-3719. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PN
9/26/06

Kakali Chaki
Supervisory Primary Examiner


KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER